

ABSTRACT OF THE DISCLOSURE:

The invention describes the synthesis and proposed usage of a tumor-specific,
5 site-specific tumor cell-killing agent. The agent binds to tumor cells with high affinity
and at the same time will bind minimally to surrounding normal cells. The agent has
conjugated to it a porphyrin, which when exposed to light, generates cell-killing reactive
oxygen species. Thus, in areas which can be irradiated by light, a site-specific, tumor-
specific cell killing can occur. The agent consists of the iron-transport protein transferrin
10 (Tf) which is conjugated with the porphyrin chlorin *e6* (Ce6). For this patent, a novel
method of conjugation was developed as conventional methods of conjugation of chlorin
e6 to the protein resulted in the loss of transferrin's biological activity. The new
conjugation procedure results in the covalent attachment of chlorin *e6* to transferrin and
yet maintains the natural activity of the protein. The synthesis occurs while the protein is
15 immobilized to QAE-sephadex, in the presence of the zwitterionic detergent CHAPS (3-
[(3-cholidamidopropyl) dimethylammonio]- 1-propanesulfonate). Using this technique,
the biological activity of the conjugated transferrin is preserved, the conjugate binds to
cell surface transferrin receptors and promotes the growth of cells in culture, all while
carrying the cell-killing chlorin *e6*. The conjugate induces a light-exposure dependent
20 killing of tumor cells in tissue culture. After injection into cancer patients, a tumor cell
killing effect will hypothetically be achieved by irradiation of the tumor site with light.
The patent covers the new-found synthesis technique for and the *in vitro* and *in vivo*
tumor cell killing usage of chlorin *e6*-transferrin.